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U.S. Department of Transportation, Docket Operations
West Building Ground Floor, Room W12-140
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Summary Grant Petition for an Exemption under Part 11 of the Federal Aviation Regulations from 14 C.F.R. 107.36, 14 C.F.R. 137.19(c), 14 C.F.R. 137.19(d), 14 C.F.R. 137.19(e)(2)(ii), 14 C.F.R. 137.19(e)(2) (iii), 14 C.F.R. 137.19(e)(2)(v), 14 C.F.R. 137.31(a), 14 C.F.R. 137.31(b), 14 C.F.R. 137.33(a), 14 C.F.R. 137.33(b), 14 C.F.R. 137.41(c), 14 CFR § 137.41(c), 14 C.F.R. 137.42, and 49 C.F.R. 175.9(b)(1).

A. SUMMARY:

On behalf of our client, University of Florida (UF), and pursuant to provisions of 14 C.F.R. 107, 14 C.F.R. 137, and 49 C.F.R. 175, UF, hereby respectfully requests expedited approval and necessary exemptions from the following listed Code of Federal Regulations ("CFR") for the purpose of operating the HSE-UAV M6E-X2 Small Unmanned Aircraft System ("sUAS") weighing 52.9 lbs. for aerial vegetation control and management operations in

remote rural operating environments. The operations will be conducted within and under the conditions outlined herein, or as may be established by the FAA, as required under 14 CFR Part 107.

The proposed operation in this Petition for Exemption are similar in nature to those currently conducted by Droneseed, Exemption No. 17261.

As described more fully below in this particular petition, the requested exemption would permit the operation of the HSE-UAV M6E-X2 by petitioner, under controlled conditions in predetermined airspace that is, 1) Limited in scope 2) Controlled as to access by mission essential personnel only. UF asks the FAA to grant its petition because (A) granting the request would benefit the public as a whole and; (B) granting the exemption will not adversely affect safety because the exemption will provide a level of safety at least equal to the existing rules, and as expressed herein, significant cost savings can be achieved by transitioning from traditional manned aerial resources to UASs.

Petitioner will operate the HSE-UAV M6E-X2 while keeping the documents required by the regulations at the ground control station and immediately accessible to the Pilot in Command (PIC) and by modification of the required markings (registration number) of the UAS to be displayed on the fuselage.

The relief requested in this Petition is considered a summary grant as the HSE-UAV M6E-X2 aircraft has been recently approved by the FAA for commercial agricultural related services in numerous other exemptions. It is also analogous that granted in Exemption No. 17261.

The name and address of the Petitioner is:

University of Florida

The primary contact for this petition, with a copy to me at the address above is:

7922 N.W. 71 Street
Gainesville FL 32653
Attn: James Leary

In support of this Petition for Exemption, UF will submit the following associated UAS operating documents:

- UF Pilot and Aircrew Training Program
- UF Flight Operations and Procedures Manual
- UF Operational Risk and Safety Manual
- M6E-X2 Manual
- UF M6E Preflight Checklists

All of these documents will be submitted on a confidential basis under separate cover, pursuant to 14 C.F.R. § 11.35(b), as the documents contain confidential commercial and proprietary information that UF has not and will not share with others. The information contained in this material is not generally available to the public and is protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq*.

B. BACKGROUND OF PETITIONER AND MANUFACTURER

The UF facilitates effective research between researchers and funding opportunities, marketing capabilities to collaborators and funding agencies, and forging institutional relationships with external stakeholders. The mission of the UF Center for Aquatic and Invasive Plants specifically is to develop and disseminate strategies for addressing the impact of invasive plants.

The HSE-UAV M6E-X2 platform chosen for the operations include the most sophisticated features, are manufactured to be durable, and are the easiest to use systems on the market. Additionally, UF strives for innovative power cell technology with improved power, performance, longevity and superior weight standards for UAS. HSE-UAV UAS are designed for maximum flight time with minimum down time. The UF helps maximize the value of their land in an efficient, cost-competitive manner utilizing UAS reducing reliance on manual labor, while minimizing environmental impact.

The UAS for the purposes of this petition is the HSE-UAV M6E-X2 sprayer drone with

a maximum takeoff weight of 52.9 lbs. when operating with full tanks:

The HSE M6E-X2 has been in production since Jan 2017 with more than 500 units sold worldwide. As a result of strenuous testing and expertise in agriculture UAVs, there have been no reported injuries or deaths related to this aircraft dating back to design and inception. The system is built with a proprietary autopilot system with triple IMU redundancy and survey-grade RTK GPS. To protect the environment and equipment, the aircraft is virtually waterproof (depending on duration of submersion, of course). The Spraying System is fully integrated to the autopilot ensuring spraying is based on GPS position and Mission Planning, preventing overspray and excessive chemical use. The handheld controller provides spoken alerts for low chemical, low battery, altitude and distance. The system ensures safe operations with automatic Return to Home in the event of low battery, loss of connection with the handheld controller, or any other critical error. The operator can also set maximum distance, velocity and altitude limits in addition to the ability to take manual control ("RC style") of the aircraft in the event of an emergency. .

UF will be utilizing the same HSE-UAV M6E-X2 as well as other proven technologies the FAA has already accepted and approved in numerous previous Exemptions. All of the appropriate documentation to accompany UF's Petition is included.

C. SYSTEM BENEFITS AND ENHANCED SAFETY

1. UF's intent along with a complete range of vegetation and noxious weed control and management services, is to apply pesticides and herbicides at their various dam and powerline locations. Spraying prevents harmful or injurious weeds, that affect areas of agriculture, forest management, and utility line infiltration. Moreover, the efficient methods to be applied by UF optimizes the use of herbicides thus reducing the negative impact of excess pesticide application and residual chemicals being left in the soil or running off into streams or the water table.
2. Applications by manned helicopters for agriculture carries significant risks of fatality.[1]

[1] See e.g., NTSB Special Investigative Report on the Safety of Agricultural Aircraft Operations, NTSB/SIR-14/01 (Adopted May 7, 2014):

This was such a concern that in 2014 the National Transportation and Safety Board commissioned a report to understand root causes. The enhanced safety achieved using an unmanned aircraft with the specifications described in this petition, as opposed to the much larger, manned aircraft carrying fuel and crew or passengers, is safer and exposes workers and other people on the ground to significantly less risk. Additionally, UF's UA use batteries which are not as flammable and explosive as 100LL or Jet A fuel. If there was an emergency where the UA crashed, there is a significantly lower chance of individuals being injured from an explosion or fire.

3. According to a USDA Economic Research Service Report, of the United States' 408 million acres of cropland, about 70% (286 million acres) is commercially treated with crop protection products. Out of that, the agricultural aviation industry treats 71 million acres of cropland aerially each year. By utilizing UAS, this vital portion of our nation's food supply can be treated in a more environmentally safe way, thus protecting our streams from excessive chemical run off, algae blooms, etc.

4. A large portion of the agricultural land is currently sprayed by crews on foot, carrying heavy loads on steep, dangerous terrain. UF will replace this method using its aircraft. It is in the interest of safety to reduce worker exposure to this difficult and dangerous environment.

5. Manned aircraft availability and scheduling are becoming increasingly difficult and costly for UF's customers. On average, each manned aerial application business has 2.1 aircraft, ranging in price from $100,000 to $1,400,000 depending on hopper size, engine type and engine size. Pilot shortages, aircraft shortages, and driver shortages are increasing. Smaller owners and non-governmental organizations without several hundred thousand acres are finding it difficult to obtain economical services with these figures. UF can increase service providers at a lower cost and alleviate pilot and

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"78 accidents [and 10 fatalities] occurred during calendar year 2013 and involved some aspect of agricultural (ag) operations, pilot training, or other crop protection activities. The report identifies the following recurring safety issues: lack of ag operations-specific fatigue management guidance, lack of ag operations-specific risk management guidance, inadequate aircraft maintenance, and lack of guidance for pilot knowledge and skills tests."

service shortages for small landowners.

6. Manned airplanes and helicopters produce significant noise pollution that disrupt the public's ability to enjoy both private and public property. UAS are much quieter and will not disrupt the public as much as manned aircraft; thus, the benefit will be recognized as a reduction in noise pollution.

7. Pesticides being sprayed from high elevations can be picked up by the wind and carried for miles. By flying at a lower altitude (6-12 m), and by never leaving the customer's site, there is a significantly reduced chance of pesticides ("driftable fines") being accidentally sprayed in the wrong area. With manned aircraft and helicopters, this can happen in a number of ways: Pilot error or map misinterpretation en route to the site, pesticides being picked up by the wind and blown onto neighboring property affecting commercial cropland and residential areas, and equipment malfunction.

D. DESCRIPTION OF UAS

The aircraft is a multi-rotor UAS aircraft comprised of a VTOL UA and a transportable Ground Control Station (GCS). It provides a wide array of essential agricultural spraying services, including watering, fertilizers, pesticides, and herbicides. It can also be equipped with sensors and equipment to detect and monitor agricultural areas that require irrigation, fertilization, or other treatments. It does not carry any flammable propellant or fuel.

Numerous companies are currently operating The M6E models throughout the United States. The complete dimensions and physical characteristics of the UAS are listed in the attached M6E-X2 Manual for FAA review.

I. Standard Components and Safety Systems

Autopilot Flight Controller - The HSE-UAV M6E-X2 employs a Proprietary Autopilot System with advanced GPS Navigation and optional high-precision RTK. This system includes a fully automated Return To Land (RTL) feature to mitigate lost signal, low battery, lost Visual Line of Sight (VLOS) and loss of pilot control (flyaway). The software provides mitigation for loss of telemetry, allowing the pilot to either continue flight in pre-programmed mode, or manually fly under

Remote Control (RC) mode. Additionally, the UAS listed in the petition is equipped geo-fencing capabilities (for both distance and altitude) as a failsafe, along with sensor redundancy logic, that is to say if one navigation sensor (GPS, Baro, IMU, etc.) provides a value significantly different than the others, that sensor will be automatically disregarded and the remaining sensor sets will be relied upon. The operator will be alerted of any discrepancies and advised to land immediately if needed.

Rotor Fail Protection - If one rotor fails, the flight controller will compensate for lost rotor and will notify operator via on-screen warnings; aircraft maintains stability allowing operator to safely land.

Dedicated Ground Station Software – The system utilizes a software tailored specifically for spraying work, thus, significantly reducing pilot workload and reducing the opportunity for human error during the flight planning phase. Operators simply outline their field, input the distance between flight rows (known as the spray swath), and the software does the rest. Maximum altitude and speed can be preloaded into the software and further protect against the risk of pilot error.

Return-to-launch (RTL) / Stop-and-Land – In addition to the instances where the Autopilot will activate this feature, the operator can use RTL to instantly stop the UAS and return it to the base point at a predetermined safe height, respectively. If it is unsafe to do so, the operator can press a button and have the drone immediately land where it is.

Geofencing and Obstacle avoidance - The UAS' flight controller is given GPS coordinates of a boundary that it cannot leave, keeping the UAS from leaving the pre-determined and defined operations area. When enabled, the UAS can "hit" the perimeter, but not fly past or through it. Manual or automatic inputs commanding the UAS to break the geofence are ignored. In the case where there is a road along the property line, or a place where a neighbor's property is located, the operator can use the Ground Station Google Maps interface and draw a line around the field. This is a perimeter that the drone will not fly outside of. If the operator were to try to fly beyond that boundary, the aircraft would approach the line and stop and hover.

Second, for an obstacle, other property, or people, and purposeful obstacle boundary can be established. This means that the aircraft will build its flight plan and avoid that obstacle. Further, the operator can specify how large of a buffer they would like to keep between the aircraft and that obstacle.

As a reminder, if there was ever a time where a non-participant person or property entered the planned flight area, the operator could immediately halt the operation by activating the

emergency “kill switch” to immediately stop the rotors or may press a switch to activate the emergency return to home feature.

Beacon - In the extremely unlikely event of a system malfunction that causes a crash, a beacon attached to the UAS will help the PIC and ground crew quickly locate it, ensuring a quick response to secure the equipment and surrounding area.

Optional RTK GPS - The UAS has a telemetry link to a base station which makes GPS corrections, giving the UAS an accurate location reading within centimeter of precision. This ensures that the UAS is flying the missions it is given and applying herbicides in a pattern much more efficiently and consistently than agricultural helicopters.[2]

Telemetry - Should a telemetry link to the base station be lost, the default action would be that the UAS abort its mission and RTL. However, because the UAS has all mission parameters stored onboard, it could also safely continue to execute a mission. If the RTK link is dropped, the positioning system would automatically revert to standard GPS and accuracy may adjust to around 1m accuracy, all without an interruption to the mission or flight. Audio alerts on the RC remote and base station computer will alert the PIC, who may opt to allow the UAS to continue its mission if it is safe to do so or interrupt the mission and bring the UAS back under RC control.

Radar Automatic Terrain Following – The UAS employs a RADAR unit to determine the distance to the ground. This greatly reduces pilot fatigue and human error by allowing the operator to input a single altitude for the spraying mission, and the UAS will adjust automatically for changes of terrain. Similar to the navigation error logic, the autopilot uses a blend of GPS, barometric and IMU data to ensure the RADAR readings are accurate. If a sudden / significant change was detected, the system would notify the operator and disregard the faulty reading. This sensor is very reliable and not impacted by spray, flying over water or other reflective surfaces (verus using a LiDAR, etc). The operator can manually disable the terrain sensor at any time during or before flights.

RC control - All missions occur with pre-programmed commands providing instructions to the UAS. At all times, a PIC has an RC remote with the ability to override the current mission. Should the RC connection be lost, the autopilot software will immediately end the mission and return the UAS to the home launch location. In this case, the UAS ascends to a height set by the

PIC in advance of the mission and determined to be safe given the surrounding terrain, normally 100-200 feet (AGL). The UAS then returns in a straight line to the launch location. The PIC may choose to resume or alter the mission if an RC link is established again while the UAS returns home.

Emergency Kill Switch - An emergency "Kill Switch" allows the operator to instantly stop motors in the event of an emergency. The context here is “human life above all else”, encouraging operators to ‘drop the drone’ in an emergency situation to preserve life and other’s property.

II. Additional Safety Functions

Full Black Box / Flight Recording of all flights: Flight data shows a real-time playback of all operator control input, GPS statuses, vibrate, shake and motor balance statuses along with battery voltage and all other critical telemetry data allowing operator to fully track entire history. All flights are automatically saved on the GCS and most recent flight is stored onboard the autopilot in case of lost communications. This further adds to safety for operator and VO training as operator-caused issues can be quickly identified and trained to correct. Further, it allows for remote diagnostics and has a financial benefit not requiring aircraft and components to be unnecessarily shipped.

Safety parameters: Max altitude, distance from home, horizontal speed and vertical speed: defaults are set by manufacturer, and the customer can set these as well based on location and operating restrictions.

LED Aviation Lighting: installed and operates whenever the UAS is powered.

Intelligent Assisted Launch and Landing: Aircraft uses GPS and IMU data to determine when the craft is fully on the ground, meaning the craft will not shut rotors off until firmly on the ground. Aircraft also uses IMU data to safely and smoothly handle “In Ground Effect” caused by the rotor downwash, which lessens pilot stress and accident likelihood for operator.

Flight Stall Prevention: Flight controller prevents accidental 'throttle zero' motor stall while in the air. In an emergency, operator can switch instantly to 'manual' mode to activate rotor kill, providing complete system override by the pilot during an in-flight emergency.

Semi-Automatic Navigation: Allows operator to manually override aircraft speed, altitude, or even adjust the horizontal place of the UAS instantly during automatic Ground Station controlled flights. This gives operators the ability to quickly respond in the event of an emergency.

Auto-lock rotors: Rotors are automatically locked when the drone is powered on, and again 5 second after subsequent landing. A special sequence must be performed to unlock (arm) the motors. Additionally, a series of system and sensor checks is performed by the autopilot such as GPS, magnetic compass, and IMUs. If a critical system fails, the autopilot will prevent the system from being armed and alert the operator.

Change of Flight Parameters: Ability to change parameters in real-time (during flight).

Flight Controller Modifications: Ability to program, calibrate, debug, and modify flight controller information without power to rotors: allows safe physical interaction with UAS while performing maintenance and servicing.

Return to Home Features: Ability to move or edit "Home" (return to home) location if original becomes obstructed (animals, people, or too far of a distance, etc.) after initial launch. If a failure occurs, UAS will land at newly designated location.

III. Operational Analysis and Flight Testing

The HSE-UAV M6E-X2 has onboard safety features to ensure the UAS can operate safely under both normal and contingency operating conditions. These features include automation to increase safety and reduce pilot workload. Some examples are the self-monitoring function (pre-takeoff diagnostics), an altitude control system, and redundant GPS flight control systems with geo-fencing. The lost-link safety default feature allows the HSE-UAV M6E-X2 to automatically hover and land in response to a lost-link event. Safety features such as the GPS warning/indicator lights and speed indicator light provide critical system status information to the pilot.

E. REGULATORY BASIS FOR PETITION AND REGULATIONS FROM WHICH EXEMPTION IS SOUGHT

1. 49 U.S.C. § 44701

The FAA is authorized to grant exemptions from its safety regulations and minimum standards under 49 U.S.C. § 44701 (“Section 44701”) “if the Administrator finds the exemption is in the public interest.” Section 44701(f) (authorizing the grant of exemptions from safety regulations and minimum standards under Section 44701(a) and (b) and Sections 44702-44716). Under 49 U.S.C. § 44701(f), the “Administrator may grant an exemption from a requirement of a regulation prescribed under subsection (a) or (b) of this section or any of sections

44702-44716 of [Title 49] if the Administrator finds the exemption is in the public interest." Listed below are specific Code of Federal Regulation ("CFR") sections from which an exemption is sought, the rationale for why an exemption is needed, and a brief summary of the operating procedures and safeguards, which are described more fully in the operating documents being submitted under separate cover, which will ensure that the proposed operations can be conducted at a level of safety that is at least equal to that provided by the rule from which exemption is sought.

To expedite the FAA's safety assessment of the proposed UAS operations, except where explicitly noted, UF agrees to conduct the proposed operations in accordance with the same applicable conditions and limitations ("Limitations") included in the previous Droneseed Exemption, Exemption No. 17261.

I. Regulations from which exemption is requested:

- 14 C.F.R. 107.36, *Carriage of Hazardous Material*
- 14 C.F.R. 137.19(c), *Certification Requirements, Commercial Operator - pilots*
- 14 C.F.R. 137.19(d), *Certification Requirements; Aircraft*
- 14 C.F.R. 137.19(e)(2)(ii), *Certification Requirements; Knowledge and skill tests; skills; approaches to the working area*
- 14 C.F.R. 137.19*(e)(2)* (iii), *Certification Requirements; Knowledge and skill tests; skills; flare-outs*
- 14 C.F.R. 137.19(e)(2)(v); *Certification Requirements; Knowledge and skill tests; skills; pullups and turnarounds*
- 14 C.F.R. 137.31(a), *Aircraft Requirements*; *Certification Requirements*
- 14 C.F.R. 137.31(b) *Shoulder Harnesses*
- 14 C.F.R. 137.33(a), *Carrying of certificate; Certificate carried on the aircraft*.
- 14 C.F.R. 137.33(b) *Registration and airworthiness certificates available*.

- 14 C.F.R. 137.41(c), *Personnel; Pilot in Command; Commercial certificate*
- 14 CFR § 137.41(c), *Personnel; Pilot in command; demonstration of knowledge and skills.*
- 14 C.F.R. 137.42, *Fastening of safety belts and shoulder harnesses.*
- 49 C.F.R. 175.9(b)(1), *Special Aircraft Operations; Exceptions; Agricultural Operations*

II. FAR Pertaining to Part 107 Requirements

A. 14 C.F.R. 107.36, *Carriage of Hazardous Material*

Part 107.36 of Chapter 14 prohibits the "Carriage of Hazardous Material" by a small unmanned aircraft. The Petitioner does not believe that this provision applies to its intended operations because holding pesticides in hoppers or tanks for aerial spraying does not constitute the "carriage of hazardous material" as contemplated by Part 107, Part 137, or Subchapter C of Chapter 49.

Part 107.36 reads as follows: "A small unmanned aircraft may not carry hazardous material." For purposes of this section, the term hazardous material is defined in 49 CFR 171.8." Section 175.9 of Chapter 49, *Special Aircraft Operations,* explains that the prohibition against carrying hazardous materials does not apply to hazardous materials "loaded and carried in hoppers or tanks of *aircraft certificated for use* in aerial seeding, dusting spraying, fertilizing, crop improvement, or pest control, to be dispensed during such an operation." (emphasis added).

B. 49 C.F.R. 175.9(b)(1), *Special Aircraft Operations; Exceptions; Agricultural Operations*

The Petitioner requests an exemption from the requirement in 175.9 that aircraft be certificated in order to be excluded from the prohibition on carrying hazardous materials because the Petitioner' UAS is not "an aircraft certified for [agricultural] use." For all of the reasons stated in 14 C.F.R. 107, the rulemaking discussion thereof, in AC 107-2, and within this Petition, the Petitioner can achieve an equivalent level of safety to a certified aircraft when carrying pesticides

in hoppers or tanks. There will be no crew on board, the aircraft will be flying in remote areas, will be subject to a pre-flight inspection, and will be operated in full compliance with Part 107. Such a determination is in accord with the exemption granted to Yamaha, although that exception did not explicitly reference 49 CFR 175.9.

III. FARs Pertaining to Part 137 Certification Requirements

UF seeks an exemption from the following FARs in Part 137: §§ 137.19(c), (d) and (e)(2)(ii)(iii) and (v) *Certification requirements*, 137.31 *Aircraft requirements*, 137.33 *Carrying of certificate*, 137.41(c) *Personnel*, and 137.42 *Fastening of safety belts and shoulder harnesses*. An exemption from these FARs is necessary because the provisions are either not compatible with or are unnecessary in the context of the proposed UAS operations.

§ 137.19(c) Certification requirements

In the previous exemptions, the FAA determined that relief from § 137.19(c) was necessary to permit persons holding a remote PIC certificate with small UAS rating to act as PIC for commercial agricultural aircraft operations when utilizing a small UAS to conduct the operations. The FAA found that a commercial or airline transport certificate that § 137.19(c) requires was not a reasonable requirement for small UAS agricultural operations. The basis for the relief was that remote PICs would comply not only with the requirements of Part 107, subPart C, but also with the additional knowledge and applicable skill requirements in FAR § 137.19(e)(1) and (2)(i), (iv) and (vi). The relief was also based, in Part, on compliance with the training requirements in operating documents.

UF's proposed operations are otherwise identical to that previously approved by the FAA in Exemption No.17261. Consistent with the FAA's prior analysis, compliance with the requirements of Part 107, subpart C, the additional knowledge and applicable skill requirements in FAR § 137.19(e)(1) and (2)(i), (iv) and (vi), and compliance with the training requirements in UF's operating documents, an equivalent level of safety will be achieved.

§ 137.19(d) Certification requirements

§ 137.31 Aircraft requirements

In Exemption No. 17261, the FAA granted Droneseed an exemption to §§ 137.19(d), *Certification requirements,* and 137.31(a), *Aircraft requirements.* Consistent with the FAA's prior analysis in Exemption No. 17261, while UF 's UAS will not have an airworthiness certificate, UF will be capable of ensuring that the UAS are in a condition for safe operation based upon a thorough pre-flight inspection and compliance with the operating documents. The UAS components have a proven operational history and contain design safety features such that operations conducted under the requirements of this exemption will not adversely impact safety.

§ 137.19(e)(2)(ii), (iii), and (v) Certification requirements
§ 137.41(c)

UF seeks an exemption from the knowledge and skill test requirements in § 137.19(e)(2)(ii), (iii), and (v) *Certification requirements,* because those requirements are not compatible or applicable to UF 's proposed UAS operations. Consistent with the FAA's prior analysis in Exemption No. 17261, UF 's training and certification program described in the operating documents provides the remote PIC with the necessary skills to safely operate the UAS. For this reason, granting relief from a demonstration of the skills described in § 137.19(e)(2)(ii), (iii), and (v) will not adversely impact safety, and therefore relief is warranted. UF 's pilots operating UAS under the exemption will still be required to demonstrate the skills listed at § 137.19(e)(2) as applicable, in accordance with the provisions of § 137.19(e), which requires such demonstration in order to obtain the agricultural aircraft operator certificate, unless otherwise exempted. Also, consistent with the FAA's finding in Exemption No. 17261, that relief from the associated knowledge and skill test requirements of § 137.41(c) is also warranted because of the relief provided to § 137.19(e)(2)(ii), (iii), and (v), UF seeks an exemption from the interrelated knowledge and skill test requirements of § 137.41(c).

F. PILOT CERTIFICATION ANALYSIS

The Part 107 certificate is intended to permit commercial UAS operations and replace the need for a commercial certificate under Part 61 when conducting operations for hire. As explained,

the Petitioner is, through its own training program, requiring experience and training beyond that required by Part 107 in order to achieve a level of safety equivalent to what would be obtained using operators holding commercial certificates under Part 61.

Moreover, the Petitioner will demonstrate the applicable practical skills required by Part 137 prior to conducting agricultural operations.

The following comparison between the commercial pilot requirements contained in Part 61 and the requirements contained in Part 107 demonstrates why the petitioner should be exempted from the provisions in Part 137 that require possession of a Part 61 commercial certificate.

Part 61.123 requires Commercial pilots to be at least 18 years of age and able to have a level of English competency. UF will require its pilots to be at least 18 years of age. English competency is required by Part 107. The following chart addresses each aeronautical knowledge requirement of 14 CFR 61.125 and explains whether it is relevant to, different from, or addressed by Part 107 operations or UF internal procedures.

Part 61.125, Aeronautical Knowledge	**UF Operations Under Part 107**
(1) Applicable Federal Aviation Regulations of this chapter that relate to commercial pilot privileges, limitations, and flight operations;	Addressed by Part 107
(2) Accident Reporting	Addressed by Part 107

(3) Basic aerodynamics and the principles of flight	Topics applicable to unmanned aircraft are included in Part 107.
(4) Meteorology	Applicable meteorology principles are covered by Part 107.
(5) Safe and Efficient Operation of Aircraft	Covered by Part 107 and included in UF training.
(6) Weight and Balance	"Loading and Performance" is addressed by Part 107. UF will comply with the weight limitations of Part 107 and will ensure that external loads do not negatively impact flight characteristics, as required by Part 107.
(7) Performance Charts	Not directly applicable.
(8) Effects of exceeding aircraft performance limitations	Not directly applicable. Topics applicable to unmanned aircraft are included in Part 107.
(9) Pilotage and dead reckoning	Not applicable.
(10) Use of air navigation facilities	Topics applicable to unmanned aircraft are included in Part 107.
(11) Decision making and judgment	Covered by Part 107
(12) Principles and functions aircraft systems	Covered by Part 107 and by UF internal procedures and use of operations manuals
(13) Emergency operations	Covered by Part 107.
(14) Night and high altitude	Not applicable.
(15) Operating within the national airspace system.	Covered by Part 107.
(16) Lighter than air ratings.	Not Applicable.

Section 127 of Part 61 contains flight proficiency requirements for specified aircraft categories. Part 107 contains no flight proficiency requirements. UF will require flight proficiency. Specifically, just as required by Part 61, the Petitioner will require demonstrated multi-rotor proficiency in: preflight preparation; preflight procedures; airport and heliport operations; hovering maneuvers; takeoffs, landings, and go-arounds; performance maneuvers; navigation; emergency operations; special operations; and postflight procedures.

Section 129 of Part 61 contains requirements for aeronautical experience. UF will require its pilots to obtain an appropriate level of aeronautical experience, using 61 CFR 129 as a guide in order to achieve an equivalent level of safety. Many of the requirements of section 129, however, are either inapplicable or excessive for UF's proposed operations. Commercial helicopter ratings require at least 150 hours of flight time. Much of this, however, need not be in a helicopter or as the pilot in command. Other flight time requirements in Part 61 are cross- country time or instrument time. There is no need for Part 107 remote pilots to obtain time spent in cross-country flight or instrument flight. UF pilots will spend all of their time flying the make and model of multi-rotor aircraft that will be used in their operations. These aircraft are far less complicated than manned aircraft. The pilots can, therefore, achieve a comparable level of experience and safety by requiring 20 hours of total flight time of a multi-rotor system as the pilot-in-command

with at least 10 take-off and landings. This will be required by the operations manual and training program.

In sum, the FAA's own "Analysis of Risk" in the Rulemaking discussion for Part 107 explains perfectly why UF should be exempted from the requirement contained in Part 137 that pilots conducting agricultural operations obtain certifications under Part 61.

> *While these airman certification requirements are necessary for manned aircraft operations, they impose an unnecessary burden for many small UAS pilots because a person obtains a pilot certificate under part 61 by learning how to operate a manned aircraft. Much of that aeronautical experience/flight training is not applicable to small UAS operations because a small UAS is operated differently than a manned aircraft. In addition, the aeronautical/flight experience currently necessary to obtain a pilot certificate under part 61 does not equip the certificate holder with all of the tools necessary to safely pilot a small UAS. Specifically, applicants for a pilot certificate under part 61 currently are not trained in how to deal with those aspects of "see-and-avoid" and loss-of-positive- control safety issues that are unique to small unmanned aircraft. Thus, requiring persons wishing to operate a small UAS to obtain a pilot certificate under part 61 imposes the cost of airman certification on those persons, but does not result in a significant safety benefit because the process of obtaining the certificate does not equip those persons with all of the tools necessary to mitigate the public risk posed by small UAS operations.*

The FAA should, therefore, exempt the Petitioner from the requirement contained in 14 C.F.R. 137.19(c) that at least one person hold a current U.S. commercial or airline transport pilot certificate and who is properly rated for the aircraft to be used.

§ 137.31(b) Aircraft requirements

§ 137.42 Fastening of safety belts and shoulder harnesses

UF seeks an exemption from § 137.31(b) *Aircraft requirements,* and § 137.42 *Fastening of safety belts and shoulder harnesses,* which relate to the installation and use of a shoulder harness and safety belt on an aircraft. An exemption from these requirements is warranted because UF UAS do not have an onboard pilot and these regulations are intended to ensure the safety of the onboard pilot during manned agricultural aircraft operations. For this reason, granting the requested relief from §§ 137.31(b) and 137.42 will not adversely impact safety.

§ 137.33(a) and (b) Carrying of certificate

UF requests relief from § 137.33(a) *Carrying of certificate*, which requires that a facsimile of the agricultural aircraft operator certificate be carried on the aircraft. The FAA has previously determined that relief from §§ 91.9(b)(2) and 91.203(a) and (b) for the carriage of the aircraft flight manual and aircraft registration onboard the aircraft is not necessary. Consistent with the FAA's prior analysis, an exemption is warranted here provided that a facsimile of the agricultural aircraft operator certificate and all certificates of registration are kept in a location accessible to the remote PIC.

Finally, given that UF UAS will not have an airworthiness certificate, relief from § 137.33(b) *Carrying of certificate,* which requires the airworthiness certificate (if not carried in the aircraft) be kept available for inspection at the base of dispensing operation is conducted,

is necessary. UF will keep registration certificates available for inspection.

UF has attempted to identify the appropriate C.F.R.s from which an exemption is needed in order to conduct the proposed operations in this Petition for Exemption. To the extent that the FAA determines that UF needs an exemption from other C.F.R.s which are not addressed or explicitly named in order to conduct the proposed operations, UF also seeks an exemption from those FARs for the reasons outlined above.

G. UAS OPERATING PARAMETERS

- Prior to any flight operation, UF will visit the area of planned operation and inspect the terrain and vantage points. UF utilizes a number of tools available to capture this environmental data, including high-resolution LiDAR, photogrammetry, and handheld surveying tools. The result is a geo-rectified model of the unit, with GPS points accurately marking the boundaries of the geofenced flight operating area.
- Following that, all state and local paperwork associated with the operation will be filed before and after operations. UF will comply with all state laws regarding the application of pesticides. These include state and local agency notification, mapping, and specified safety procedures.
- The PIC will hold a Part 107 remote pilot airman certificate and be at least 18 years of age.
- Prior to beginning operations, the PIC will take all preflight actions as set forth in its flight manual, which includes a comprehensive preflight checklist.
- At least one visual observer (VO) will be used for each aircraft during all operations. Both the PIC and VO will maintain a safe distance from the UAS when it is operating as set forth in its flight manual.
- Flights will be limited to a maximum altitude of no more than 400 feet above ground level (AGL) and will normally be flown at altitudes of 20 to 30 feet AGL or less over private fields and other agricultural areas.
- To further ensure the area of operation is clear of all non-Participants and any other potential hazards, prior to beginning agricultural operations (with UAS weighing 55 pounds or more), a *small* UAS will be used to survey and access the operating environment.
- The areas to be flown are remote agricultural sites or other uninhabited agricultural sites which makes for excellent VLOS conditions.
- All operations will occur in a closed-access environment.
- All personnel at the site will be controlled by UF at the time of flying. The M6E-X2 shall operate from on-site takeoff/landing locations directly next to the PIC and co-located VO. The PIC and the VO will be able to verbally communicate during all operations or will utilize hand-held radios on site. In addition, signage announcing future spraying operations will be posted at the site entrance warning any customer employees or non-Participants that an aerial spraying operation is occurring. This is an industry standard process.
- The maximum flight time for each UAS flight will be a maximum of 30 minutes, with

most agricultural flights lasting approximately 10-20 minutes.

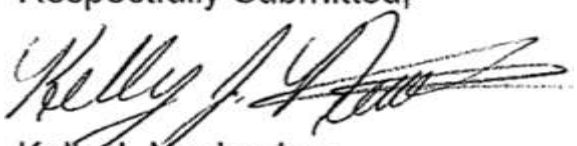
H. FEDERAL REGISTER SUMMARY FOR PUBLICATION AND COMMENT

UF, an operator of Small Unmanned Aircraft Systems (sUAS) is applying for an exemption from 14 C.F.R. 107.36; 137.19(c); 137.19(d); 137.19(e)(2)(ii), (iii), and (v); 137.31(a) & (b); 137.33(a) and (b); 49 C.F.R. 175.9, Code of Federal Regulations to operate an unmanned aircraft system (UAS) for commercial agricultural- related services. The relief requested is similar to that granted in Exemption No. 17261 Droneseed and should be considered a summary grant.

I. CONCLUSION

For the foregoing reasons, UF respectfully requests, that the FAA grant this Summary Grant Petition for Exemption. Should you have any questions, or if you need additional information to support UF Petition, please do not hesitate to contact the undersigned.

Respectfully Submitted,



Kelly J. Neubecker
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Cc. James Leary